State of New Jersey

Before The

Board of Public Utilities

In the Matter of Offshore Wind Transmission	**)**	**Docket No. QO20100630**

Comments of Anbaric Development Partners, LLC following Stakeholder Meetings of March and April 2022

Anbaric Development Partners, LLC (Anbaric) thanks the New Jersey Board of Public Utilities for hosting four Offshore Wind Transmission stakeholder meetings from March 22 through April 12, 2022, and welcomes the opportunity to contribute to the discussion through these comments. Below we reiterate the importance of the BPU's approach, briefly explain how Anbaric's Boardwalk Power Link portfolio of projects follows this approach, identify how some other submissions diverge from this approach and conclude with some observations about the value of Anbaric's submissions.

Importance of the BPU Approach

New Jersey, under the leadership of Governor Murphy, has solidified its place a national leader in offshore wind. Beginning with the commitment to procure 7,500 MW by 2035, with a detailed procurement schedule including over 3,700 MW contracted to date, building on that with the establishment of the WIND Institute, and culminating in the investment in the development of the Wind Port, New Jersey has a visionary, pragmatic, and comprehensive approach to accelerating the growth of the offshore industry and providing the public investments in infrastructure, supply chain, and workforce development necessary to allow the Garden State to lead the industry's growth.

Now, with its commitment to secure offshore wind transmission infrastructure in coordination with PJM and procuring that transmission with the State Agreement Approach, the State has embraced the critical step to make its commitments bear fruit: the transmission system necessary to enable the State to reach its goals and the offshore wind to accelerate its growth while reducing impact on the environment and protecting the ratepayer.

The Murphy Administration began this effort with signing the legislation that authorized the Board of Public Utilities to solicit offshore wind transmission independent from generation. The next step was the BPU's November 2019 Offshore Wind Transmission Stakeholder Meeting with industry-wide discussions on best practices to meet its offshore wind goals, the November 2020 Order, In the Matter of Offshore Wind Transmission, formally requesting PJM to commence the SAA transmission planning process, PJM's 2021 Open Window solicitation under the SAA process, and now the evaluation of the 79 submissions by 13 experienced transmission developers.

This SAA solicitation is a path that will keep New Jersey at the forefront of the offshore wind industry. It follows industry-leading efforts in Europe, notably in the Netherlands, Germany, and now the United Kingdom, that have recognized the value of planned transmission and building the transmission infrastructure to allow the rapid and economic growth of the industry, as well as Texas' CREZ (Competitive Renewable Energy Zones) transmission build-out of its terrestrial grid for on-shore wind.

The SAA solicitation builds on the November 2020 order and the Murphy Administration's priorities to seek a complete high-performing on-shore and off-shore transmission system to meet the State goals at the lowest cost to the New Jersey ratepayer.

Anbaric's Approach

Anbaric has designed its proposals (cumulatively referred to as the "Boardwalk Power Portfolio") to help the State of New Jersey achieve its goal of delivering 7,500 MW of offshore wind by the year 2035. The Boardwalk Power Portfolio presents a complete and flexible set of transmission solutions designed to address New Jersey's present and future offshore wind needs. The projects proposed by Anbaric are modular, based on a common set of specifications, can be combined in different ways to accommodate the future offshore wind solicitations, and can be scaled to build out the offshore grid to accommodate the next stage of offshore wind's growth that will likely include goals well beyond the State's current 7,500 MW target. The Boardwalk Power Portfolio achieves these goals at the lowest cost to the ratepayer.

Technology and Design

The Boardwalk Power Portfolio includes proposals for offshore transmission links from six potential offshore wind farm locations to three onshore Points of Interconnection (POIs). These projects address the transmission needs that will result from New Jersey's offshore wind solicitation schedule in what is – by a large margin – a more cost effective and reliable approach than the radial design utilized for the first projects in the US.

Anbaric's proposals utilize proven high-voltage direct-current (HVDC) technology to ensure cost-effective, reliable, and efficient transmission of power with the lowest possible impact on the environment, fisheries, and local communities. Anbaric's proposals are based on a design standard which can be repeated for subsequent offshore wind farms, thereby cutting development costs, and minimizing risks. The offshore substations will be designed and equipped with the necessary equipment and functionality to be connected to adjacent offshore substations and are designed for expandability and ease of upgrades.

Cost Savings, Environmental Impacts and Flexible, Future Ready-Operations

The key technical design aspects and parameters of the Boardwalk Power Portfolio projects have been standardized to achieve cost savings resulting from modularity and compatibility with other offshore links to enable the development of an offshore grid. The design standard approach

allows Anbaric to build on lessons learned and minimize uncertainties and risk. The award of multiple Projects based on a design standard approach within the Boardwalk Power Portfolio enables the optimization of fabrication leading to efficiency gains during project management and in operation, resulting in substantial cost savings for the State of New Jersey rate payers. Moreover, by combining transmission corridors and onshore converter station sites, the Project reduces the impact to the environment, minimizes the cost of surveying and permitting, and reduces the overall cost of construction. This modular, flexible, and future-ready transmission system is a key tool to unlock the benefits of an interconnected offshore grid for New Jersey.

The Boardwalk Power Portfolio establishes the foundation for an offshore transmission grid that will be ready for additional offshore wind generation solicitations beyond the State's current 7,500 MW target.

Review of other submissions

Below we offer a brief review of some other submissions into the State Agreement Approach that were discussed during the stakeholder meetings.

One submission comprises a mix of AC and DC transmission links, including a 275 kV AC substation at Perth Amboy from which two 1200 MW 320 kV symmetrical monopole HVDC underground cable systems run to a new 500 kV AC substation connecting into the Deans – East Windsor line. This submission also includes a retrofit of the 230 kV Werner substation to accommodate an additional 1200 MW of wind power via an AC connection and a battery energy storage system.

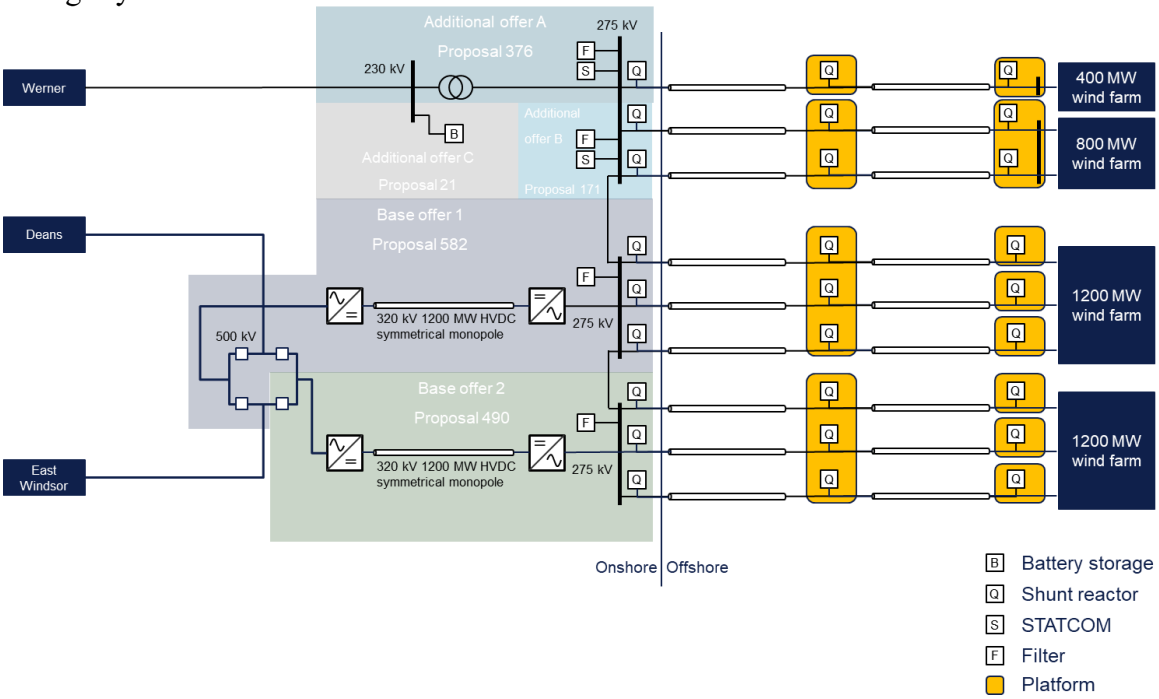

Figure 1

This submission raises substantial technical design and cost issues.

Technical design

By proposing an AC point of connection, the proposal forces the offshore wind developers to use AC transmission technology offshore. This type of technology has a limited transmission distance and cannot reach all of the lease areas from Perth Amboy and is hence an incomplete solution for New Jersey's offshore shore transmission need. AC transmission cables have a limited transmission capacity of 350 – 400 MW which declines with transmission distance. This means that the proposed solution will require at least 9 AC submarine cable circuits but probably more, to connect 3.6 GW, as opposed to 2-3 HVDC links.

Due to their capacitive nature, AC cables produce reactive power proportionally to their length. Shunt capacitors are applied at both ends of the cable to ensure this reactive power does not flow into the grid. Due to the long distance from Perth Amboy to the lease areas, additional intermediate reactive power compensation platforms will be necessary, increasing the number of offshore platforms and the visual impact from shore. The reactive power flows reduce the cable capacity available for wind power export. Because of this, a larger cable conductor cross-section is necessary leading to increased CAPEX compared to HVDC solutions. The reactive power flows also lead to additional power losses in the cable system which are present regardless of the amount of wind power production. In addition, the combination of multiple shunt reactors and cable sections creates a harmonic resonance circuit which is hard to stabilize, and additional filter circuits are necessary. For these reasons, only two such systems have been realized globally thus far (Hornsea 1 and 2 in the UK) and have not been repeated since.

The proposal does not include any references to or possibilities for regarding future networking or connections to a true offshore backbone grid.

Cost

In contrast to a full HVDC export link which requires only one onshore converter station and one expansion of an existing onshore substation per link, this submission requires two onshore converter stations and two new onshore AC substations, increasing the required footprint and impact to local communities, as well as total cost.

Finally, the proposal only includes the onshore part of the offshore wind export and collection infrastructure and does not include offshore export and collection grid components. It thus assumes that these will be built by the offshore wind developer. Consequently, the additional cost of these offshore transmission components will be reflected in a higher cost of energy.

Another submission consists of an offshore wind export transmission solution consisting of a mix of AC and DC transmission links, specifically three point-point symmetrical monopole HVDC transmission links connecting different offshore wind farms to different onshore points of interconnection: Sewaren 230 kV, Larrabee 230 kV and Deans 500 kV. The HVDC transmission

links connecting to Sewaren and Larrabee can be implemented as 320 kV and 1200 MW systems or as 400 kV and 1400 MW systems. The offshore converter stations will have a 275 kV AC substation with five feeders. Assuming that three feeders are necessary to connect offshore wind farms, two feeders will be available to interlink neighboring offshore platforms with a single 275 kV AC submarine cable. To compensate the reactive power generated by the high-voltage AC submarine cables, two shunt reactors are placed on the offshore converter station. To connect the 66 kV array cables of the offshore wind farms, additional intermediate AC collector platforms will be needed.

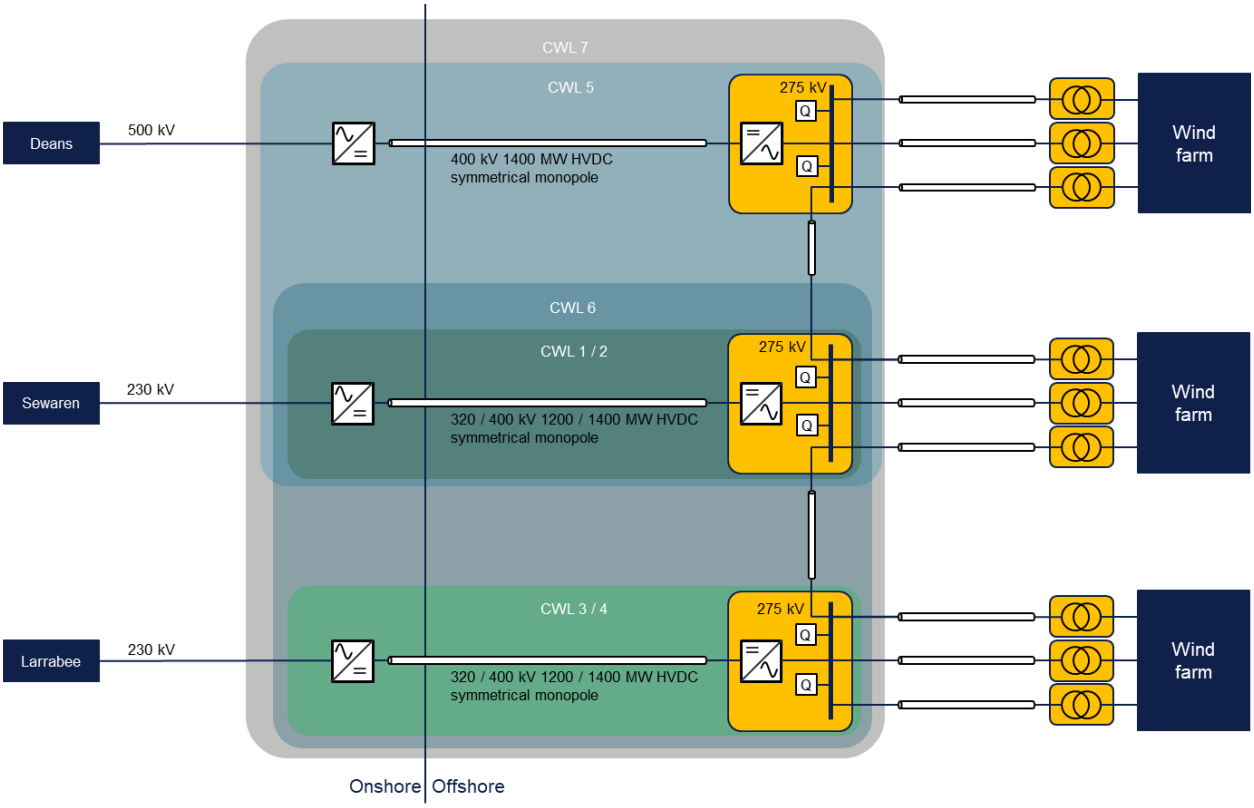

Figure 2

This submission also raises technical design and cost issues.

Technical design

The single cable AC interlinks are limited to transporting at most 400 MW, which is sufficient to supply auxiliary power to adjacent neighboring platforms in the event of an export link outage and can to some degree realize redundant transmission capacity. However, the capacity is insufficient to meet the needs of a true offshore grid, that is with backbone functionality, and therefore cannot be considered a design that is ready for the future, that is a design able to operate as generation projects increase in size and technologies in the grid and the offshore industry mature.

Always-energized interlinks are optimally executed using HVDC interties. This is due not only to the ability to move larger amounts of power between platforms that are not distance limited, but also because of the losses that are incurred to provide the reactive power support needed to utilize the AC interlinks, even when they are not providing any power transfer between platforms.

Cost

The proposal does not include the offshore 275 kV collection grid components, i.e. submarine cables and 275 kV / 66 kV intermediate collector platforms. It thus assumes that these will be built by the offshore wind developer. Consequently, the additional cost of these offshore transmission components will be reflected in a higher cost of energy.

The shunt reactors placed on the offshore converter station are only necessary in case the platform interlinks are realized. Given the uncertainty that this may occur, the cost of the reactors, the cost of the platform space and associated support systems can be considered anticipatory investment. In case the interlinks are cancelled, this anticipatory investment turns into a stranded asset, the cost of which is born by the New Jersey rate payer. While such an investment may be prudent at some point in the future, now to avoid unnecessary costs on the rate payer, the lowest cost technical solution should be selected.

Anbaric's Value

The Boardwalk Power Portfolio shown in 3 has been designed with the goal to minimize the amount of infrastructure needed, reducing both cost as well as impacts to the environment and local communities.

Design

High-capacity low-loss end-end HVDC export links minimize the number of cables required and remove the need for reactive power compensation and harmonic filters, whereas the direct connection concept cuts out the need to intermediate AC collector platforms. HVDC platform interlinks improve availability and the possibility to interconnect the platforms into a future backbone, at the lowest possible anticipatory investment and with the highest performance. The platforms have been designed to be HVDC breaker-ready with a plug-and-play configuration, allowing for true future-ready expandability in a configuration *that is the only* option submitted to the BPU for realizing all of the benefits of offshore grid backbone functionality. As with other flexibility offered with Anbaric's bids, future interlink options can be accelerated to day one configuration if the BPU so desires.

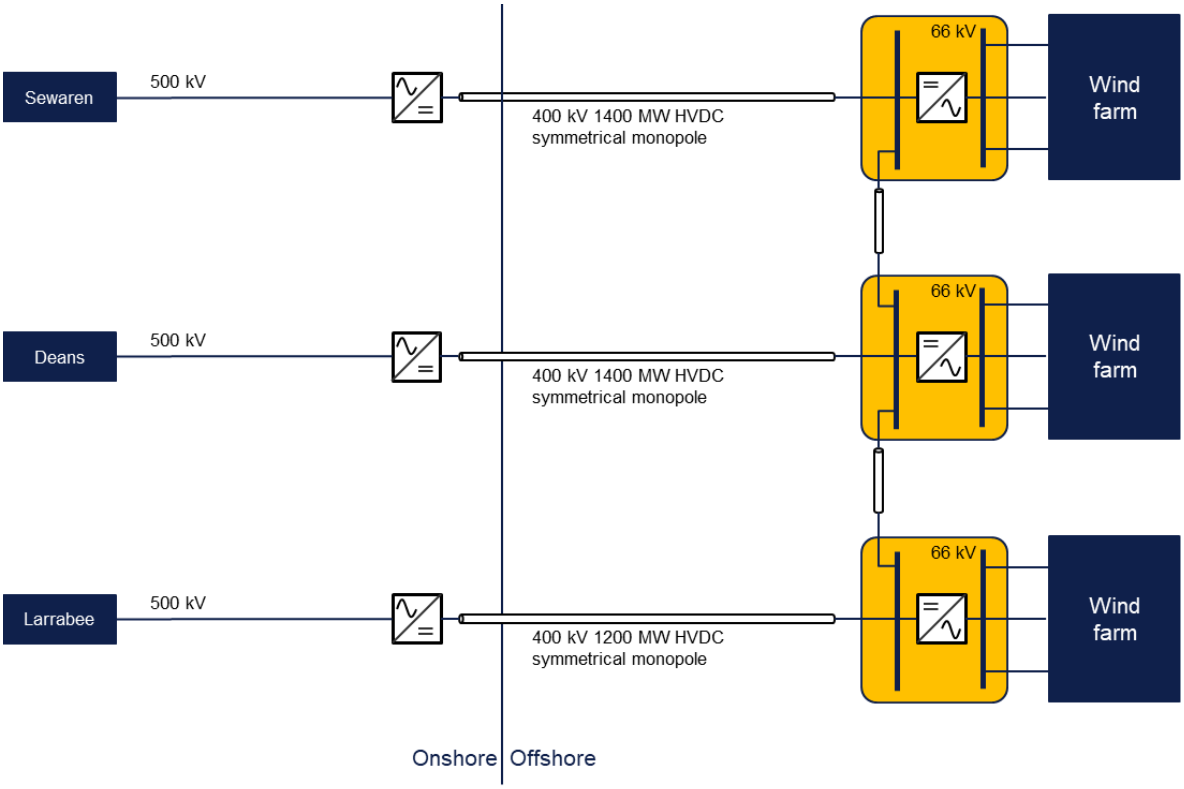

Figure 3 – Boardwalk Power Portfolio concept

Cost

Anbaric's cost containment package starts with an ROE of 8.5% that is not increased with various basis point adders, a common practice in FERC-approved rates. To ensure that costs are not simply shifted in accounting, the Anbaric proposal limits equity to no more than 45%. Further this ROE is structured with incentives to be on-budget and on-time, with ROE reductions that result from schedule or cost overruns. Finally, the Anbaric proposal includes a hard cost cap.

Beyond the benefits quantified above, planning transmission in advance of generation development reduces siting risk. New Jersey's shore is environmentally and ecologically important, highly developed, and is a treasure valued by New Jersey residents. Minimizing the number of cables coming to shore, the number of construction cycles, and choosing landing points with the utmost concern of all stakeholders will be critically important to the success of New Jersey's offshore wind goals. Some contracted offshore wind projects have already faced stiff local opposition that could now or in the future lead to delays and increased costs for the generators and rate payers. Siting these lines to shore in advance of and separate from generation will significantly reduce these risks to generators and will help ensure the success of New Jersey's offshore wind program.

Conclusion

Anbaric once again commends Governor Murphy and the State of New Jersey for their leadership in advancing offshore wind as a path to accelerate the development of offshore wind and transition to a low-carbon economy and commends the BPU for its foresight and nationwide leadership in engaging in the PJM SAA process to plan the transmission necessary to achieve the State's goals.

Anbaric is grateful for the opportunity to offer these comments and to participate in this process.

Sincerely,

Clarke Bruno
Chief Executive Officer
Anbaric Development Partners, LLC